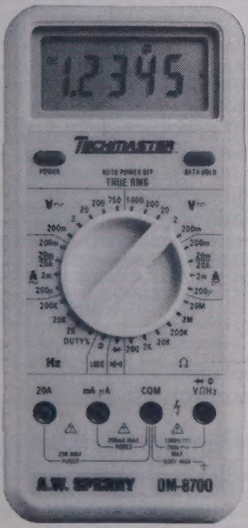
OPERATING INSTRUCTIONS

TECHMASTER™

Model DM-8700

TRUE RMS DIGITAL MULTIMETER



PLEASE READ THESE OPERATING INSTRUCTIONS CAREFULLY
Misuse and or abuse of these instruments cannot be prevented by any printed word and may cause injury and or equipment damage. Please follow all these instructions and measurement procedures faithfully and adhere to all standard industry safety rules and practices.

A.W. SPERRY INSTRUMENTS INC.

245 MARCUS BLVD., HAUPPAUGE, NEW YORK 11788
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FIVE YEAR LIMITED WARRANTY

A.W. Sperry Instruments, Inc., warrants that this Techmaster Series instrument has been carefully tested, inspected, and warranted for five (5) years from the date of purchase by the original end user, provided the instruments have not been misused, damaged due to negligence, neglect or unauthorized repair, abused or used contrary to the operating instructions. Instruments and proof of purchase in the form of a legible copy or original of the sales receipt clearly identifying the distributor, model number and date of purchase must be returned to A.W. Sperry Instruments, Inc., Attention: Customer Service Center, 245 Marcus Boulevard, Hauppauge, New York 11788, postage prepaid for examination and verification of manufacturing defect under warranty. A.W. Sperry Instruments, Inc., shall be the sole judge of such defect. The liability of A.W. Sperry Instruments, Inc., shall be limited to the repair or replacement as its sole option of any defective product. **THIS WARRANTY AND THE OBLIGATIONS AND LIABILITIES OF SELLER THEREUNDER ARE EXCLUSIVE AND IN LIEU OF AND BUYER HEREBY WAIVES ALL OTHER REMEDIES, EXPRESS WARRANTIES, GUARANTEES OR LIABILITIES, OF AND FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES OR WHETHER OR NOT OCCASSIONED BY SELLER'S NEGLIGENCE. THIS WARRANTY SHALL NOT BE EXTENDED, ALTERED OR VARIED EXCEPT BY A WRITTEN INSTRUMENT SIGNED BY SELLER AND BUYER. SOME STATES ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIED LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.**

NOTE: Recommended calibration should not exceed one year. Calibration service charges are not covered under terms and conditions of warranty.

WARRANTY REGISTRATION

To validate warranty, please complete the warranty registration card enclosed with your instrument and return to A.W. Sperry Instruments, Inc., 245 Marcus Blvd., Hauppauge, N.Y. 11788 within 10 days of purchase. No postage required.

WARRANTY RETURN

Refer to section "Return for Repairs" for complete instructions. All warranty returns must include a legible copy or original of the sales receipt clearly identifying the model number, serial number and date of purchase.

Sec. 1 DESCRIPTION

This exceptional 4-½ digit, handheld, digital multimeter has the capacity of reading up to 10 functions on up to 34 ranges. This DMM offers a powerhouse of measurement capability in a self-contained housing. It is designed for the professional at work in the field or in the laboratory, yet simple enough to operate making it perfect for the hobbyist too.

Safety was a prime consideration in the design of this DMM. Housed in shock resistant ABS plastic, this instrument stands up to the use and abuse of everyday service, and electrically insulates the user from potential shock hazards. Electronic overload protection against accidental application of voltage to resistance and continuity circuits, combined with rugged construction make it a durable and reliable instrument.

Sec. 2 FEATURES

DM-8700

- 34 Ranges, 11 Functions
- Drop Proof to 10 feet
- Water Resistant
- TRUE RMS Measurements
- 20A DC/AC Range
- Auto Power Off
- Meets IEC-348, UL-1244 standards
- Overload Protection on all Ranges
- Logic Indicator
- Frequency, Duty Cycles
- Data Hold
- Built-in Hanger and Tilt Stand
- Large 4½ Digit LCD Display with Annunciators
- 5 Year Limited Warranty
- Safety Yellow

Sec. 3 SPECIFICATIONS

Display:	4-½ digits, 17mm large LCD maximum reading 19999 or -19999 and units sign annunciators.
Polarity:	Automatic, (-) negative polarity indication.
Overrange:	"1" most significant digit blinks.
Low Battery Indication:	The " " is displayed when the battery voltage drops below the operation voltage.
Sampling Rate:	2.5 times per second nominal. 1 time per sec. on frequency count.
Crest Factor:	5
Operating Environment:	0°C to 50°C (32° to 122°F) at < 70% RH.
Storage Environment:	-20°C to 60°C (-4°F to 140°F) 0-80% RH without battery.
Power:	Single standard 9-volt battery, NEDA 1604, JIS006P IEC6F22.
Power Consumption:	14mW typical.
Battery Life:	300 hours typical with zinc carbon.
Fuse:	20A, 600V 10.3 × 38mm fast acting AWS Part #F-20 0.5A, 600V 6.3 × 25mm fast acting AWS Part #F-21.
Dimensions:	7.5"H × 3.4"W × 1.5"D (189H × 87W × 37D mm).
Weight:	12.9 oz. (370g) including battery.

RANGES:

DC Volts

Range	Resolution	Accuracy 18° To 28°C	Input Impedance
200mV	10uV	±(0.05% rdg+3d)	10MΩ
2V	100uV	"	"
20V	1mV	"	"
200V	10mV	"	"
1000V	100mV	"	"

NMRR: Greater than 50dB at 50Hz or 60Hz.
CMRR: Greater than 100dB at 50Hz or 60Hz.
Overload Protection: 1200VDC or Peak AC
500VDC or Peak AC on 200mV range.

AC Volts (Trus RMS)

Range	Resolution	Accuracy 18° To 28°C		Input Impedance
		(50Hz to 1kHz)	(1kHz to 2kHz)	
200mV	10uV	±(0.7% rdg+10d)	±(2.0% rdg+10d)	10MΩ
2V	100uV	"	"	"
20V	1mV	"	"	"
200V	10mV	"	"	"
750V	100mV	±(1.5% rdg+10d)	Unspecified	"

Overload Protection: 1200VDC or Peak AC
500VDC or Peak AC on 200mV range.

DC Current

Range	Resolution	Accuracy 18° To 28°C	Full Scale Burden Voltage
200uA	10nA	±(0.5% rdg+5d)	400mV
2mA	100nA	"	"
20mA	1uA	"	"
200mA	10uA	"	"
20A*	1mA	±(1.0% rdg+10d)	900mV

Overload Protection: 500mA/600V fuse on mA inputs (fast blow fuse)
20A/600V fuse on 20A inputs (fast blow fuse)
* 10A continuous, 20A for 60 seconds maximum

AC Current (True RMS)

Range	Resolution	Accuracy 18° To 28°C (50Hz to 1kHz)	Full Scale Burden Voltage
200uA	10nA	±(0.8% rdg+10d)	400mA
2mA	100nA	"	"
20mA	1uA	"	"
200mA	10uA	"	"
20A*	10mA	±(1.5% rdg+10d)	900mV

Overload Protection: 500mA/600V fuse on mA inputs (fast blow fuse)
20A/600V fuse on 20A inputs (fast blow fuse)
* 10A continuous, 20A for 60 seconds maximum

Resistance

Range	Resolution	Accuracy 18° To 28°C	Open Circuit Volts
200Ω	10mΩ	±(0.2% rdg+10d)	3.5Vdc
2kΩ	0.1Ω	±(0.15% rdg+3d)	"
20kΩ	1Ω	"	"
200kΩ	10Ω	"	"
2MΩ	100Ω	±(0.2% rdg+3d)	"
20MΩ	1kΩ	±(1.0% rdg+5d)	"

Overload Protectino: 500VDC or peak AC-Electronic (NO FUSE BLOW)

Continuity

Range	Audible Indication	Response Time	Open Circuit Volts
2V	Less than 150Ω	Approx.100ms	3.3V

Overload Protectino: 500VDC or peak AC-Electronic (NO FUSE BLOW)

Diode Test

Range	Resolution	Accuracy	Test Current	Open Circuit Volts
2V	0.1mV	±(0.5% rdg+1d)	1.0mA	3.5V

Overload Protectino: 500VDC or peak AC-Electronic (NO FUSE BLOW)

Frequency

Range	Resolution	Accuracy 18℃ To 28℃	Input Impedance
2kHz	0.1Hz	±(0.5% rdg+3d)	10MΩ // 10pF
20kHz	1Hz	"	"
200kHz	10Hz	"	"

Sensitivity: 50mV RMS
Input Frequency: More than 10Hz, Pluse Width >2usec
Overload Protectino: 500VDC or peak AC-Electronic (NO FUSE BLOW)

Duty Cycle

Range	Resolution	Pulse Width	Accuracy (5V Logic)
0.0 to 99.9%	0.1%	>10usec	±(1.0% rdg+10d)

Overload Protectino: 500VDC or peak AC-Electronic (NO FUSE BLOW)

Logic indicator

Threshold		Pulse Width (min.)	Pluse Rep (max.)	Pluse Rise (max.)
Logic Hi ▲	Logic Low ▼			
2.8V±0.8V	0.8V±0.5V	25nsec	1 Mpps	10 usec

Detector: AC coupled
Impedance: 120K ohms//100pF
Indication: 40 msec beep at logic hi
Overload protection: 500VDC or peak AC-Electronic(NO FUSE BLOW)

Sec. 4 SAFETY RULES

1. Read these operating instructions thoroughly and completely before operating your DMM. Pay particular attention to **WARNINGS** and **CAUTIONS** which will inform you of potentially dangerous procedures. These instructions must be followed.
2. Always inspect your DMM, test leads and accessories for any sign of damage or abnormality before every use. If any abnormal conditions exist (e.g. broken test leads, cracked cases, display not reading, etc.), do not attempt to take any measurements. Refer to section 14 Return for Repair.
3. Never ground yourself when taking electrical measurements. Do not touch exposed metal pipes, outlets, fixtures, etc., which might be at ground potential. Keep your body isolated from ground by using dry clothing, rubber shoes, rubber mats, or any approved insulating material.
4. Never touch exposed wiring, connections or any live circuit conductors when attempting to take measurements.
5. Never replace the protective fuse inside the DMM with any other than the AWS Part number specified or approved equal.
6. Remember: Think Safety and Act Safely.
7. When testing for the presence of voltage, make sure the voltage function is operating properly by reading a known voltage in that range before assuming that a zero reading indicates a no-voltage condition.
8. Calibration and repair should be performed by qualified maintenance personnel only.
9. Do not attempt calibration or service unless another person, capable of rendering first aid and resuscitation is present.
10. Do not install substitute parts or perform any unauthorized modification of the instrument. Return the instrument to A.W. Sperry Instruments for service and repair to insure that safety features are maintained.
11. To avoid electric shock use CAUTION when working with voltages above 40Vdc or 20Vac. Such voltages pose a shock hazard.
12. Do not operate this instrument in an explosive atmosphere (i.e. in the presence of flammable gases or fumes, vapor or dust).

Sec. 5 UNPACKING AND CONTENTS CHECK

The TECHMASTER™ DM-8700 comes complete and ready to use. Check the following contents list when unpacking. If any pieces are missing notify the distributor you purchased the instrument from or A.W. Sperry Instruments, Inc.

- Operating Instructions #207
- TL-58 Test Leads, 1 red, 1 black heavy duty with prod tips connected to 90° shielded banana plugs. Use with TECHMASTER™ DM-8700.
- 9V Transistor Type Battery (AWS Part #B-4) - See Battery Replacement section 10.2 for proper installation.
- Two Fuses installed, One F-20 Fuse, fast acting, high interrupting capacity Bussman KTK 20 Amp, 600Vac rating 13/32 × 1½. One F-21 Fuse, ceramic type, fast acting .5A 600Vac rating 6.3mm × 25mm. One spare F-21 Fuse. - See Fuse Replacement section 10.3.

Sec. 6 BATTERY REPLACEMENT

This DMM has a self-contained power supply consisting of One 9V Transistor Type Battery (NEDA #1604, AWS Part #B-4).

When the multimeter displays the ' ' the battery must be replaced to maintain proper operation.

WARNING

TO PREVENT ELECTRICAL SHOCK HAZARD, TURN OFF THE MULTIMETER AND DISCONNECT TEST LEADS BEFORE REMOVING THE BACK COVER.

1. After disconnecting test leads and turning off the multimeter, remove back cover by removing the three screws; then lift off the back cover.
2. Replace the battery.
3. Replace the main seal O-ring.
4. Replace the back cover being careful not to damage O-ring.

CAUTION

Failure to correctly install back cover may damage O-ring, which in turn will reduce or absolve the water resistant nature of applicable meter.

Sec. 7 FUSE TEST AND REPLACEMENT

Use the following steps to test the internal fuses of the meter:

1. Turn the function/range switch to the (→+ 🔊) position. Plug a test lead into the VΩ input connector.
2. Touch the probe to the uA, mA input connector. The display should indicate 1.2000 or less, otherwise the fuse is probably bad.
3. Touch the probe to the 20A input connector. The display should indicate 0.0007 or less, otherwise the 20A fuse is probably bad.

WARNING

TO PREVENT ELECTRICAL SHOCK HAZARD, TURN OFF THE MULTIMETER AND DISCONNECT TEST LEADS BEFORE REMOVING THE BACK COVER.

mA uA Input Terminal

1. After disconnecting test leads and turning off the multimeter, remove back cover by removing the three screws; then lift off the back cover.
2. Remove the battery from the battery compartment, disconnect the battery from the battery connector and set the battery aside.
3. Carefully remove the fuse (1×0.25") from the fuse holder. Replace with a 500mA/600V replacement fuse, AWS Part #F-21 or approved equal.
4. Re-connect the battery and replace it in the battery compartment.
5. Replace the main seal O-ring.
6. Replace the back cover by reversing the procedure used to remove it.

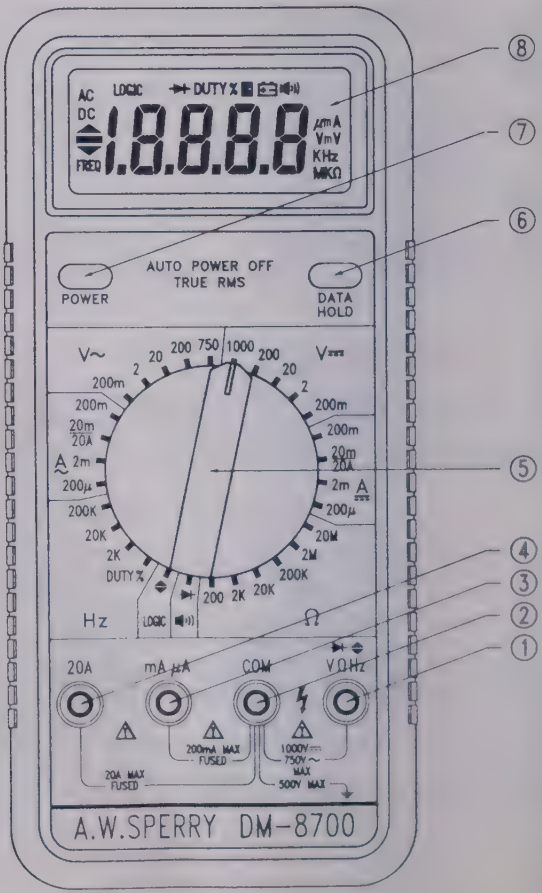
20A Input Terminal

1. After disconnecting test leads and turning off the multimeter, remove back cover by removing the three screws; then lift off the back cover.
2. Remove the battery from the battery compartment, disconnect the battery from the battery connector and set the battery aside.
3. Carefully remove the 20A/600V fuse from the 20Amphere fuse holder. Replace with a new 20A/600V fuse, AWS Part #F-20 or approved equal.
4. Replace the 500mA/600V fuse.
5. Re-connect the battery and replace it in the battery compartment.
6. Replace the main seal O-ring.
7. Replace the back cover by reversing the procedure used to remove it.

CAUTION

Failure to correctly install back cover may damage O-ring, which in turn will reduce or absolve the water resistant nature of applicable meter.

Sec. 8 FRONT PANEL CONTROLS



① **V Ω Hz ⊣◆ ▲▼ Volt, Ohms, Diode, Logic Input Terminal**

This is the positive input terminal for all functions except current measurements. Connection is made here using the accessory red test lead.

② **COM Common Terminal**

This is the negative (ground) input terminal for all measurement modes. Connection is made to it using the accessory black test lead.

③ **mAuA Milliamp/Microamp Input Terminal**

This is the positive input terminal for current measurement (AC or DC) up to 200mA. Connection is made to it using the accessory red test lead.

④ **20A 20 Ampheres Input Terminal**

This is the positive input terminal for current measurement (AC or DC) up to 20A. Connection is made to using the accessory red test lead.

⑤ **Function Selector Rotary Switch**

This rotary switch selects the measurement function when aligned with function symbols on the panel.

⑥ ( ) **HOLD Data Hold**

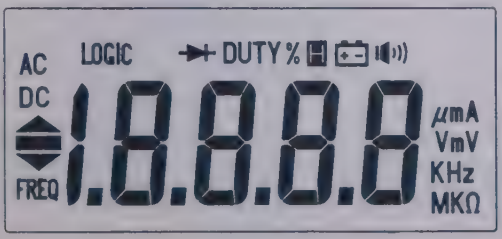
This switch is used to hold data for all functions during a measurement. Pressing this button once, freezes the value and "H" appears in the display. Pressing this button again clears the display and allows a new measurement to be carried out.

⑦ ( ) **POWER Power Switch**

This switch is used to turn meter on or off.

⑧ **Liquid Crystal Display (LCD)**

This liquid crystal provides a 4-½ digit measurement data display having a maximum count of 20000, as well as unit and function annunciators.



Symbols/ Units	Descriptions
DC	Appears for the DC current and voltage modes
AC	Appears for the AC current and voltage modes
▬	Polarity marks which appears when a DC signal measurement value is negative
▲ ▼	On the logic test mode, when TTL logic high, (▲) indicator will appear. When TTL logic low, (▼) indicator will appear.
FREQ	Appears when the frequency counter function has been selected.
LOGIC	Appears when the logic test mode has been selected
⊣▶⊢	Appears when the diode test mode has been selected
)))	Appears when the continuity check has been enabled
DUTY %	Appears when the duty cycle measurement mode has been selected.
H	Indicates that the data hold condition has been enabled
⊟	Lights to indicate that battery voltage has dropped excessively
°C °F	Units for temperature measurements
uA mA A	Units for current measurements.
mV V	Units for voltage measurements
Hz KHz	Units for frequency measurements
Ω ΩK ΩM	Units for resistance measurements

⑨ Other Functions

•Auto Power Off

Automatic power-off extends the life of the battery by turning the meter off. After approximately fourty-five minutes has occurred since the last rotary switch operation. The meter turns back on if the POWER switch is pressed.

•True RMS Measurements

This multimeter allows direct measurement of the true RMS value of a signal. This is the best way to measure parameters used for measurements relating to power.

The relationship between the total True RMS (AC + DC) and the component AC and DC signals is given by the following expression:

$$\text{True RMS} = \sqrt{(\text{AC RMS Component})^2 + (\text{DC Component})^2}$$

RMS is equivalent to that DC value which dissipates the same amount of power in a resistor as the original signal and can be visualized by the relationships:

$$\text{Power} = \frac{VRMS^2}{R} = \frac{VDC^2}{R}$$

"Average-responding" meters provide accurate RMS readings for sinusoidal signals, but can introduce significant errors when measuring nonsinusoidal waveforms. The following table shows the errors that result when the average-responding measurement is used instead of the True RMS value.

Power Calculations (watts) from Voltage Measurements (Vpk = 100V, load = 1Kohm resistor)

	ACRMS average responding	AC True RMS	Error
Sine wave	5.0	5.0	0%
Square wave	12.3	10.0	+23%
Triangle wave	3.1	3.3	-6%

This multimeter is AC coupled and will accurately measure the AC RMS component of an output signal. The DC voltage function will measure the DC component. To obtain the total True RMS value, measure the RMS AC component on the AC function and the DC component on the DC function. Then, calculate the True RMS value, using the measured AC and DC components and the True RMS expression given above.

AC convertors of all types are limited by their frequency response and input dynamic range. Measurements of complex waveforms will not be affected by convertor bandwidth limitations, provided that all significant AC components contained within the waveforms are within the bandwidth of the convertor.

Crest factor is a measure of the input dynamic range of an AC convertor. It expresses the ability of the convertor to accept a signal that has large peak values compared to its RMS value without saturating the convertor circuitry and degrading the specified accuracy. Crest factor is defined as the ratio of the peak voltage to the total AC RMS voltage.

$$\text{Crest Factor} = \frac{\text{V(PEAK)}}{\text{V(AC RMS)}}$$

If the crest factor of a waveform is not known, determine the crest factor as follows:

For AC coupled True RMS meters, AC couple the waveform to an oscilloscope and measure the peak voltage with respect to the ground reference. Divide the peak voltage by the RMS voltage measured by the multimeter. The resultant is the crest factor.

Sec. 9 OPERATION

Before making any measurements always examine the instrument and accessories used with the instrument for damage, contamination (excessive dirt, grease, etc.) and defects. Examine the test leads for cracked or frayed insulation and make sure the lead plugs fit snugly into the instrument jacks. If any abnormal conditions exist do not attempt to make any measurements. Instead refer to sec. 14 Return for Repairs.

Sec. 9.1 VOLTAGE MEASUREMENTS

1. Insert the black and red test leads into the respective "COM" and "V-Ω" jacks.
2. Place the range selector switch into the 1000DCV position if a dc voltage is to measured or into the 750ACV position if an ac voltage is to be measured. Always start in the highest range of the function to be measured.

CAUTION

To avoid possible electric shock, instrument damage and/or equipment damage, do not attempt to take any voltage measurements if the voltage is above 1000Vdc/750Vac or if the voltage is unknown. 1000Vdc and 750Vac is the maximum voltages that this instrument is designed to measure. The "COM" terminal potential should not exceed 500V measured to ground.

3. Apply the test leads to the two points at which the voltage reading is to be taken. Be careful not to touch any energized conductors with any parts of your body.
4. Turn the range selector switch to the next lower range for a more accurate reading only if the reading is within that next lower range.
5. When measurements are completed, disconnect the test leads from the circuit under test. Remove the test leads from the instrument.

Sec. 9.2 CURRENT MEASUREMENTS

1. Insert the black and red test leads into the respective "COM" and "20A" terminals.
2. Place the function switch to the 20A position. Always start with the highest range of the function to be measured.

CAUTION

Do not attempt to measure currents in circuits capable of delivering greater than 600V. Since the fuse is rated at 600V damage or injury could occur.
The 20A input terminal is protected by a 20A/600V hi energy, fast blow fuse. The 200mA input terminal is protected by a 500mA/600V fuse.

3. Completely de-energize the circuit in which the current is to be measured. Place the DMM in series with the conductor carrying the current which is to be measured. Energize the circuit.
4. If the reading is less than 0.20 Amps, you can switch to a lower range for greater accuracy. If not, you have completed your measurement.

CAUTION

Before changing ranges, always de-energize the circuit completely. An open circuit exists between the test leads during range change on the DMM.

5. To change to a lower range, move the red test lead to the "mA" jack on the DMM and switch the range selector switch to the "200mA" position.

CAUTION

The mA ranges are fuse protected. To avoid possible electrical shock, instrument damage and/or equipment damage, do not:

1. Attempt to take mA current readings on circuits having more than 0.2A current flow.
2. Impress a voltage between the "COM" and "mA" terminals exceeding 600V ac/dc. Some circuit damage may result for voltages below 600V ac/dc.
3. Raise the "COM" terminal potential above 500V to ground.
4. Energize the circuit. If the reading is within the next lower range, switch to that range after completely de-energizing the circuit under test. Continue changing to lower ranges if the reading is within the next lowest range to obtain the best accuracy.
5. Completely de-energize the circuit before removing the test leads.

Sec. 9.3 RESISTANCE AND DIODE MEASUREMENTS

1. Insert the black and red test leads into the respective "COM" and "V-Ω" terminals.
2. Place the range selector switch into the Ω range desired for a measurement. (The diode check entails injecting a given current into the diode junction to be tested and reading the voltage drop across the diode.)

CAUTION

All resistance and diode measurements should be taken on de-energized circuits only. To avoid possible electrical shock, instrument damage and/or equipment damage do not connect the "COM" and "V-Ω" terminals to circuits having a potential difference exceeding 500Vdc/ac. Do not connect the "COM" terminal to potential exceeding 500V to ground.

3. Completely de-energize the circuit or device which is to be measured. Connect the test leads to the device (the red test lead is positive with respect to the black test lead). When measuring a diode, connect the "V-Ω" terminal to the anode. A reading of [1] indicates an overrange condition. This will occur with the test leads open on all resistance ranges. Of overrange occurs when taking a reading, switch to the next highest range.

   NOTE: On the diode test range, the display will indicate 3.15 to 3.45V if the diode junction is reverse biased or if the circuit is open.

i. (open) (misprint)

Sec. 9.4 CONTINUITY MEASUREMENTS

1. Place the range selector switch into the ⊣◀ 🔊 position.
2. Insert the black and red test leads into the respective "COM" and "V-Ω" terminals.

CAUTION

All continuity measurements should be taken on de-energized circuits only. To avoid possible electrical shock, instrument damage and/or equipment damage do not connect the common and ohm terminals to circuits having a potential difference exceeding 500Vdc/ac. Do not connect the common terminal to potentials exceeding 500V to ground.

3. Touch the test leads to the two points at which continuity is to be tested. The tone will sound if the reading on the display is approximately less than 150 Ω.

Sec. 9.5 LOGIC MEASUREMENTS

1. Insert the black and red test leads into the respective "COM" and "V-Ω" terminals.

> **CAUTION**
>
> To avoid electric shock, instrument damage and/or equipment damage, do not exceed 500Vdc or ac while set to take measurements in the logic test range.

2. Place the function switch to the LOGIC (▲ / ▼) position.
3. Connect the black probe to the common buss of the logic circuit to be tested. Connect the red probe to the point to be tested. On a TTL logic 1 the logic high (▲) indicator will appear. On a TTL logic 0 the logic low (▼) indicator will appear.

Sec. 9.6 FREQUENCY AND DUTY CYCLE MEASUREMENTS

1. Place the range selector switch into the "Hz" range desired for a measurement.
2. Insert the black and red test leads into the respective "COM" and "V-Ω" terminals.

> **CAUTION**
>
> The frequency ranges have overload protection to 500VAC/VDC. DO NOT EXCEED THIS LIMIT. To do so could damage your multimeter.

3. Apply the test probs to the points across which the frequency is to be measured, and read the result directly from the display.
4. To make duty test during frequency measurement, Place the range selector switch into the "DUTY%" position. The display will indicate 0% to 99.9% of the frequency duty cycle.

Sec. 10 MAINTENANCE

Maintenance consists of periodic cleaning, battery replacement, fuse replacement and recalibration.

Sec. 10.1 CLEANING

The exterior of the instrument can be cleaned with a soft clean cloth to remove any oil, grease or grime from the exterior of the instrument. Never use liquid solvents or detergents. If the instrument gets wet for any reason, dry the instrument using low pressure "clean" air at less than 25 PSI. Use care and caution around the LCD display protector and areas where water or air could enter the interior of the instrument while drying.

Sec. 10.2 BATTERY REPLACEMENT

Required when " " appears on display or nothing appears. See BATTERY REPLACEMENT in section 6.

Sec. 10.3 FUSE REPLACEMENT

Required when current ranges do not function. See FUSE REPLACEMENT in section 7.

Sec. 11 ACCESSORIES

The following accessories are available to expand the measurement capabilities of the DM-6700. Refer to the respective data sheets or operating instructions for full specifications.

Sec. 11.1 AC CURRENT MEASUREMENT - SJA-870

The Model SJA-870 is a split core current transformer capable of measuring AC currents up to 1200Aac.

Input:	0-1200Aac max.
Output:	0-1Vac at (≥ 1MΩ) Load
Accuracy:	± 3%rdg (1A) with conductor in center of jaw
Frequency:	50-400Hz

Sec. 11.2 HIGH VOLTAGE DC MEASUREMENT - HVP-860

The Model HVP-860 is a high voltage probe capable of measuring up to 50,000Vdc

Input:	0-50,000Vdc
Output:	0-5Vdc at a 10MΩ load
Accuracy:	±(1.5% of F.S.)

CAUTION

The HVP-860 is designed to be used by technicians trained in High Voltage measurement techniques. It is designed for use on high impedance, low energy circuits only. These types of circuits are normally found in electronic equipment. It is not designed to be used on High Voltage electrical distribution equipment and circuits. These type of circuits have essential unlimited energy, where special equipment is recommended. DO NOT use on these types of High Energy circuits!

Sec. 11.3 CARRYING CASE - C-67

Carrying Case for DM-8000 series

Sec. 11.4 PVC SHOCKGUARD HOLSTER - C-68

Holster for DM-8000 series

Sec. 11.5 ALLIGATOR CLIPS - AG-940

Two black insulated Push-on Alligator Clips

Sec. 12 CALIBRATION

Calibration on these meters should be performed every year. This can be done by sending the instruments prepaid to:

A.W. Sperry Instruments, Inc.
Customer Service Department
245 Marcus Boulevard
Hauppauge, N.Y. 11788

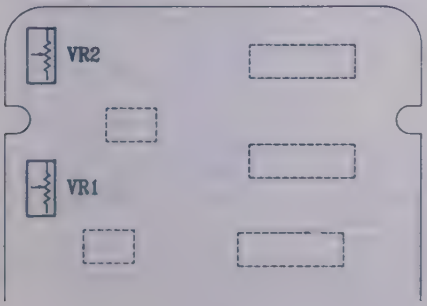
Specify in writing that calibration is necessary. The instrument will be returned to you normally within one week. Estimates will be furnished upon request.

CAUTION

The following procedure should be performed by persons trained and qualified in electronics and electronic equipment service. DO NOT attempt this procedure if not qualified.

WARNING

Do not attempt calibration or service unless another person, capable of rendering first aid and resuscitation is present.



Sec. 12.1 CALIBRATION PROCEDURE

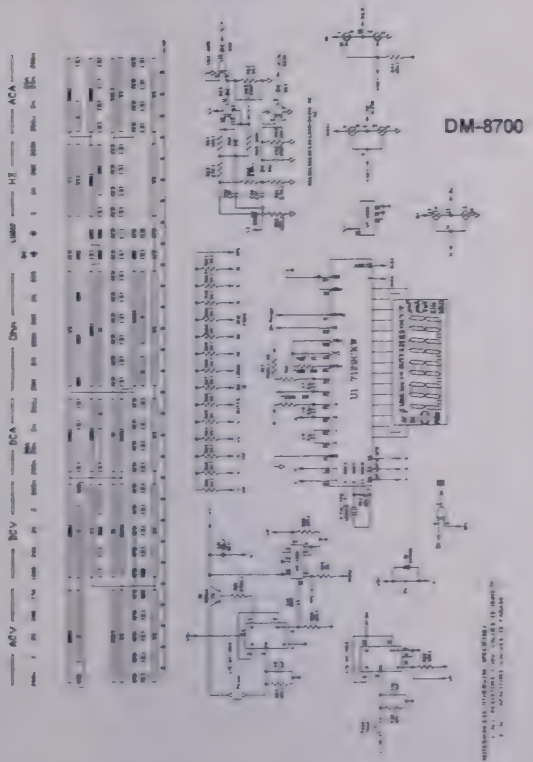
The procedure should be performed at an ambient temperature of 25°C ±2°C and at a relative humidity of less than 80%. Allow the instrument to stabilize at this temperature for a minimum of 30 minutes.

1. Remove the back case screw, carefully pry up the back case.
2. Set the Range switch to the "200mVdc" position.
3. Set the output of the DC calibrator for 190.0mV ± 0.005% and connect it to the "V-Ω" and "COM" input terminals.
4. Adjust VR1 until the display reads 190.00mV ± 1 digit.
5. Carefully inspect the other DCV ranges. Your readings should be within specification ±0.05% + 3 digits.
6. There is no adjustment for ACV. Calibrate DCV first.
7. Carefully inspect the ACV ranges. Your readings should be within ±0.7% + 10 digits of the ACV calibration source.
8. Set the output of the DC calibrator for 1.9A ± 0.02% and connect it to the "20A" and "COM" input terminals.
9. Adjust R9 (shunt resistor) until the display reads 1.9A.
10. If the reading is over 1.9A, add solder to R9. If the reading is under 1.9A, shave away lightly some of the solder and metal from R9.
11. Carefully inspect the other DCA ranges. Your readings should be within specification ±0.5% + 5 digits.
12. Turn off calibrator and disconnect from the DMM.
13. Set the Range switch to the "2KHz" position.
14. Apply a 5V 1KHz TTL signal to the "V-Ω" and "COM" input terminals.
15. Adjust VR2 until the display reads 1.0000KHz. Then disconnect the signal source from the Multimeter.
16. Install the back case and insert the back case screw.

CAUTION

Failure to correctly install back cover may damage O-ring which in turn will reduce or absolve the water resistant nature of applicable meter.

Sec. 13 DIAGRAMS
Sec. 13.1 CIRCUIT DIAGRAM



Note: Subsequent revisions to this document may exist.
Use for general references only.

Sec. 13.2 PARTS LIST

P/N	DM-8700 Description			
R01	Res.	Chip	1MJ	1/10W(0805)
R02	Res.	Chip	1MJ	1/10W(0805)
R03	Res.	Chip	1MJ	1/10W(0805)
R04	Res.	Chip	1MJ	1/10W(0805)
R05	Res.	Chip	1MJ	1/10W(0805)
R06	Res.	Chip	1MJ	1/10W(0805)
R07	Res.	Chip	1MJ	1/10W(0805)
R08	Res.	Chip	1MJ	1/10W(0805)
R09	Res.	Chip	1MJ	1/10W(0805)
R010	Res.	Chip	1MJ	1/10W(0805)
R011	Res.	Chip	1MJ	1/10W(0805)
R012	Res.	Chip	1MJ	1/10W(0805)
R013	Res.	Chip	1MJ	1/10W(0805)
R014	Res.	Chip	1MJ	1/10W(0805)
R015	Res.	PTC	1.5K/550V	
R1	Res.	Precision Decade Resistor		
R2	Res.	MF	100B	0.4W
R3	Res.	MF	56KJ	1/2W
R4	Res.	MF	56KJ	1/2W
R5	Res.	MF	900D	0.4W
R6	Res.	MF	90D	0.4W
R7	Res.	MF	9D	0.4W
R8	Res.	MF	0.99D	0.4W
R9	Res.	Alloy wire	0.01Ω	
R10	Res.	CF	27KJ	1/4W
R11	Res.	MF	3.9KF	0.6W
R12	Res.	MF	1KF	0.6W
R13	Res.	MF	18KF	0.6W
R14	Res.	Chip	10MJ	1/10W(0805)
R15	Res.	Chip	220KJ	1/10W(0805)
R16	Res.	Chip	560KJ	1/10W(0805)
R17	Res.	Chip	560KJ	1/10W(0805)
R18	Res.	Chip	100KJ	1/10W(0805)
R19	Res.	Chip	1MJ	1/10W(0805)
R20	Res.	Chip	10MJ	1/10W(0805)
R21	Res.	Chip	270KJ	1/10W(0805)
R22	Res.	Chip	10MJ	1/10W(0805)
R23	Res.	Chip	10MJ	1/10W(0805)
R24	Res.	FU	100J	0.33W(NFR25)
R25	Res.	FU	47J	0.33W(NFR25)
R26	Res.	CF	33KJ	1/4W
R27	Res.	MF	80F	1/4W
R28	Res.	CF	10KJ	1/4W
R29	Res	CF	1MJ	1/4W

P/N	DM-8700 Description			
R30	Res	CF	5.6KJ	1/4W
R31	Res	CF	1MJ	1/4W
R32	Res.	Chip	10MJ	1/10W(0805)
R33	Res	Chip	10MJ	1/10W(0805)
R34	Res.	Chip	10MJ	1/10W(0805)
R35	Res.	CF	1KJ	1/4W
R60	Res	Chip	120KJ	1/10W(0805)
R61	Res.	Chip	2.7MJ	1/10W(0805)
R62	Res	Chip	2.2MJ	1/10W(0805)
R63	Res.	Chip	27KJ	1/10W(0805)
R64	Res	Chip	10MJ	1/10W(0805)
R65	Res.	Chip	100KJ	1/10W(0805)
R66	Res	Chip	10MJ	1/10W(0805)
R67	Res	Chip	1MJ	1/10W(0805)
R68	Res.	CF	1MJ	1/4W
R69	Res.	CF	10MJ	1/4W
R70	Res.	CF	4.7MJ	1/4W
R71	Res.	MF	56KG	1/4W
R72	Res.	CF	27KJ	1/4W
R73	Res.	CF	100KJ	1/4W
R74	Res.	MF	10KG	1/4W
R75	Res.	MF	10KG	1/4W
R76	Res.	MF	100KF	1/4W
R77	Res.	MF	470KF	1/4W
R78	Res.	MF	8.4KF	1/4W
VR1	Vr Res		1K	Top Adj.
VR2	Vr Res		10K	Top Adj.
C1	Cap.	Vc Cap.	5-100P	Top Adj.
C2	Cap.	Vc Cap.	3-20P	Top Adj.
C3	Cap.	CE	22uF/16V	
C4	Cap.	CE	22uF/16V	
C5	Cap.	Y5V	0.1uF/25V ±20% (1206)	
C6	Cap.	Y5V	0.1uF/25V ±20% (1206)	
R7	Cap.	Y5V	0.1uF/25V ±20% (1206)	
C8	Cap	CMP	0.22uF/63V±10%	
C9	Cap.	Chip(X7R)	1nF/63V ±20% (0805)	
C10	Cap.	Chip(X7R)	10nF/63V ±20% (0805)	
C11	Cap.	CE	22uF/16V	
C12	Cap.	CE	100uF/16V	
C13	Cap.	CE	100uF/16V	
C14	Cap.	CM	0.01uF/50V ±5%	
C15	Cap.	CC	100pF/50V ±20%	
C16	Cap.	Chip(X7R)	1nF/63V ±20% (0805)	
C60	Cap.	Chip(Npo)	47PF/63V ±20% (0805	

P/N	DM-8700 Description		
C61	Cap.	Chip(Npo)	47PF/63V ±20% (0805)
C62	Cap.	Chip(X7R)	300PF/63V ±20% (0805)
C63	Cap.	Chip(X7R)	300PF/63V ±20% (0805)
C64	Cap.	CM	0.01uF/50V ±5%
C65	Cap.	CC	2200pF/50V ±20%
C66	Res	CM	0.01uF/50V ±5%
C67	Res	CM	0.01uF/50V ±5%
D1	Diode 1N4001 (1A)		
D2	Diode 1N4004 (1A)		
D3	Diode 1N4004 (1A)		
D4	Diode 1N4004 (1A)		
D5	Diode 1N4004 (1A)		
D6	Switch Diode 1N4148		
D7	Switch Diode 1N4148		
D8	Switch Diode 1N4148		
D60	Chip Diode BAS16 (SOT23)		
D61	Chip Diode BAS16 (SOT23)		
D62	Chip Diode BAS16 (SOT23)		
D63	Chip Diode BAS16 (SOT23)		
D64	Chip Diode BAS16 (SOT23)		

P/N	DM-8700 Description
D65	Chip Diode BAS16 (SOT23)
Q1	Chip TR PNP BSR16 (T8) (SOT23)
Q2	Transistor NPN 2SC1815
Q3	Transistor NPN 2SC1815
U1	TSC7129CKW (QFP-44)
U2	TSC04BJ (1.25V)
U3	C-MOS 4521 (SO-16)
U4	C-MOS 4013 (SO-14)
U5	True RMS DA737 8Pin Dip
U6	C-MOS CD4011 14Pin Dip
U7	C-MOS CD4053 (SO-16)
U60	C-MOS CD4070 (SO-14)
U61	C-MOS CD4011 14Pin Dip
U62	C-MOS CD4518 16Pin Dip
U63	C-MOS ICL7555 8Pin Dip
F1	Fuse 0.5A/250V (FAST BLOW)
F2	Fuse 20A/600V (FAST BLOW)
X'TAL	120KHz
CD1	GAP1600V

Sec. 14 RETURN FOR REPAIRS

Before returning your digital multimeter for repair be sure to check that the failure to operate properly is not due to the following:

1. Weak battery.
2. Open fuse.
3. Open, loose or intermittent test leads.

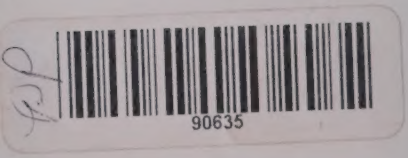
If these conditions do not exist and the instrument fails to operate properly, return the instrument and accessories prepaid to:

A.W. Sperry Instruments, Inc.
Customer Service Department
245 Marcus Blvd.
Hauppauge, N.Y. 11788

State in writing what is wrong with the instrument. All warranty repairs must include proof of purchase in the form of a legible or original copy of the sales receipt clearly identifying the distributor, model number and date of purchase and must have a warranty card on file. See warranty statement on page 1 for full warranty disclosure. Repair estimate will be furnished if requested for out of warranty instruments. Be sure to include all accessories which may be related to the problem, and a note describing the malfunction you observed.

NOTE

NOTE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